

Preserving Video Game Significance:

A Practical Guide for Video Game Preservation, Exhibition, and their Significant Properties

by Benjamin C. Todd

[btodd7@jhu.edu](mailto:btodd7@jhu.edu)

Johns Hopkins University,

Museum Studies Digital Curation Certificate Program

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### Abstract

This paper addresses the question: (1) what are the limitations of video game preservation and video game exhibitions; and, 2) what solutions currently exist for video game preservation and video game exhibitions? The author showcases previous academic literature to provide context on what the perceived challenges and limitations are for both video game preservation and video game exhibitions. Then the author analyzes a variety of selected video games such as *World of Warcraft*, *Final Fantasy IV*, *Dwarf Fortress*, and *Star Fox 64* to create the framework for a model for determining the significant properties of a video game. For this paper, significant properties refer to the important elements of a game that make it historically important and therefore the features that should be considered the highest priority for reservation and/or exhibition (e.g. From large elements such as how many players can access the same *World of Warcraft* server, to small elements such as the speed of the *Pong* ball). Finding the significant qualities of a video game is difficult because of the variety of games, but an implementation of a model serves to reduce the difficulty of selection and preservation. Each game's perceived significant qualities affect what should be prioritized during digital preservation as well as exhibition. The model can serve as the framework for libraries, archives, and museums (LAM) when addressing what video games should be acquired and what aspects of a video game should be prioritized during ingest.

*Keywords: Video Game Preservation, Video Game Exhibition, Video Game Significant Properties*

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## Introduction

Video games are a new medium when compared to other media of entertainment, such as television, movies, and print. Although video games have many varied definitions, this paper uses the *Dictionary.com* definition as it is the most broad: “Any of various interactive games played using a specialized electronic gaming device or a computer or mobile device and a television or other display screen, along with a means to control graphic images” (Dictionary.com, n.d.). To further define the important elements, a video game must be (1) interactive, (2) be run by an electronic device, and (3) is outputted to a visual display. This definition allows the paper to include all the various types of fringe cases that may be desirable for preservation.

Since its early days as more of a modern technological marvel, the video game industry has become a staple of contemporary culture. According to a 2018 Pew Research Center survey: “43% of U.S. adults say they often or sometimes play video games...” (Perrin, 2018). With such a large audience, video games have become a subculture that manifests in multiple ways; examples of this is the recent growth of video game e-sports (video game competitions), video game themed concerts, video game adaptations such as movies and books, and even video game inspired art. All of these were spurred by the rising popularity of video games and the impact on culture.

In recent history, video games have begun to permeate the museum space with museums such as: Strong Museum of Play in New York, the National Videogame Museum in Texas, and Digital Game Museum. Both the Smithsonian and Museum of Modern Art (MoMA) have begun to incorporate video games into their collections as well. A specific example is the current fourteen video games that have been accessioned at MoMA which is said to be the start of their

proposed forty game collection (Antonelli, 2012). This shows that video games are beginning to be seen as preservation worthy, but this opens new questions about how to best preserve and display this interactive medium. The difficulty of video game exhibition and preservation, compared to other types of media, are due to technical limitations, legal limitations, and contextual limitations. When considering technical limitations, one must consider whether original hardware preservation is sustainable or if one should use emulation (e.g.: to recreate the original computer environment). This consideration raises the issue of authentic experiences: to what degree must the future experience of playing a preserved video game recreate the original experience. For legal limitations, one must understand that most game companies have a vested interest in protecting their intellectual property. Therefore, museum personnel must ensure they understand current Digital Millennium Copyright Act (DMCA) laws to know current legal boundaries of preservation. When referring to contextual limitations, one must consider how to convey and preserve a game's context. This is so an outsider can understand what makes the game a unique work and why is it historically important. Yet, how does one accurately exhibit this interactive medium when each game requires different types of interactions? An example of this is when a game requires a much more involved interaction to showcase the extent of what makes that piece unique (this could be an example of when a game uses unique game mechanics), while other games may only require a short time to showcase why it is historically important (an example of this could be when showcasing a game's aesthetic choice). Yet, unlike paintings and sculptures, there is a breadth of technical elements to a video game that might deem it historically valuable.

The purpose of the following paper is to explore the questions: what are the limitations and challenges of video game preservation, what preservation strategies are effective for video

games and what are the current strategies for exhibition? It is necessary to examine current video game preservation literature to create a landscape of current strategies and a shared vocabulary, while also analyzing significant properties of games firsthand to understand the fundamental aspects of a game that helps answer why it is a challenge to both preserve and exhibit games. The information from the video game literature along with the fundamental aspects of the game analyses will be used to construct a framework for a video game significant properties questionnaire. This questionnaire will serve as a guide to help LAM professionals gauge the significant properties of a video game and with it recommended preservation and exhibition strategies.

### **Literature Review**

Most literature on video game preservation has come out in the last decade. To supplement the academic side, the author chose to use some sources from the industry side (i.e. video game journals) since they have been a monumental force in the foundational stages of video game preservation and emulation. Prior to conducting a preliminary review of the literature, it is helpful to survey the literature within two different lenses. The first lens is surveying the limitations and the challenges of preservation (these two are related and therefore it is only logical to lump them together when reviewing the research); the second lens is that of video game exhibition (which in itself is an entirely different problem than that of preservation).

#### **The First Lens: Video Game Preservation**

A natural starting place for a literature analysis is to look at perhaps the most monumental piece of literature in the field: *Preserving Virtual Worlds Final Report* (PVW). This

report was a collaborative research project between the Rochester Institute of Technology, Stanford University, the University of Maryland, the University of Illinois, as well as support from the Library of Congress. The primary goal of this research was to:

...investigate issues surrounding the preservation of video games and interactive fiction through a series of case studies of games and literature from various periods in computing history, and to develop basic standards for metadata and content representation of these digital artifacts for long-term archival storage. (McDonough et al., 2010, p.5)

The article uses a variety of video games as case studies to showcase how much preservation strategies varies from game to game. An important note is that *PVW* takes a broad approach when it comes to preservation of the video game industry. They state:

For our project, a virtual world means something like a digital setting whose properties are stable and coherent enough to deliver a consistent ludic or interactive experience to two or more users or to the same user over time. A virtual world also, however, inevitably involves some form of imaginative project based on the promise of inhabitable space. (McDonough et al., 2010, p.5)

Therefore, the report advocates for preserving not only the physical video game but also the cultural environment that is associated with the game as well. While this is an important undertaking, this is beyond the scope of this paper. Nonetheless, the contribution of the report to the study of video game preservation cannot be understated. The *PVW*'s list of video game preservation problems are used to frame the remainder of this section, due to the report's legacy largely framing the following academic literature.

**Obsolescence:** The *PVW* breaks up this category as hardware obsolescence and software obsolescence. While they require very different strategies the message is the same: the original objects and the means to use the original objects are being lost. Since video games require specific virtual environments to run the software correctly, it means that both physical equipment and software are essential (McDonough et al., 2010, p.14). This is both a challenge and a limitation. While obsolescence is a challenge known all too well within every facet of

preservation work, the lack of support or sense of urgency from the video game companies themselves present a limitation. Answers to these problems of obsolescence usually is found within emulation (e.g. recreation of the original computer environment). When it comes to emulation, while it is an answer to obsolescence, it creates tension due to the legal ambiguity about using emulation techniques. James Newman is a Professor of Digital Media and a co-founder of UK's National Videogame Archive. He published a book on the subject of video game obsolescence and video game preservation entitled *Best Before: Videogames, Supersession and Obsolescence*. One of his book's messages is a call-to-action for the video game industry and cultural organizations to act quickly before parts of video game history disappear forever. While Newman agrees with the *PVW* notion of obsolescence, he posits why video games are rapidly decaying. He states:

Not only might games be under threat from material and digital decay as their data, storage media, interfaces and systems inevitably and rapidly deteriorate, but they are vanishing as the commercial pressures of the marketplace conspire to make them unviable. It is not merely that we must act to arrest the 'natural' death of these games but that their demise is being 'artificially' accelerated in the service of commercial and competitive advantage. (Newman, 2012, p.23)

For Newman, the industry and their desire for "newer and better" experiences promoted rapid obsolescence.

Yet, hobbyists are a driving force behind maintaining old products and extending the life of games when their original developers wont. Newman also mentions in his book where he quotes another author by stating: "many users will persist for years, gradually upgrading and delaying obsolescence and even perpetuate the circulation of older cultural commodities" (Moore as cited in Newman, 2012, p. 84). While emulators are usually the go-to example of how hobbyists extend the life of a video game, some projects go much further than that. A team of hobbyists create modifications for software or in some cases create entirely new engines by



reverse-engineering the games. An example of this is *Daggerfall Unity* which is a faithful recreation of *Elder Scrolls II: Daggerfall*, a 1996 Bethesda Softworks game that requires MS-DOS to function (Walker, 2019). Modern Windows operating systems (OS) no longer has MS-DOS compatibility, which has made MS-DOS games, including *Daggerfall*, much more difficult to play. A team recreated *Daggerfall* with a new video game engine (called Unity) that makes it work with modern systems. While a player needs to own a copy of *Elder Scrolls II: Daggerfall* to play *Daggerfall Unity* (a game free to download from their developers), it in itself isn't an authentic version of the original game nor is it an emulated game (Walker, 2019). It is a more of an "accurate reimagining." This is an example of the lengths hobbyists will go to ensure their favorite games are accessible. An example of hardware obsolescence is one of the talking points of Michael Mansfield, associate curator at the Smithsonian American Art Museum, who gave a talk about the coming extinction of Cathode Ray Tube (CRT) TVs. He explains, "We have a number of artworks that were designed to play on a CRT television screen, a cathode ray tube television, and those televisions when they were originally built have a twenty to thirty thousand hour life ... now CRT screens are no longer available..." (Smithsonian American Art Museum, 2012). Both the *Daggerfall Unity* example and the CRT example showcase the impact obsolescence has on preservation.

**Scarcity:** Some video games were made with a very limited quantity, this compounded with the rapid obsolescence has made some video games extremely rare (McDonough et al., 2010, p.14). A trend made worse by the fact that some video game companies themselves aren't saving their objects. Georgina Goodlander, exhibition coordinator for the Art of Video Games exhibit at the Smithsonian American Art Museum, described working with the video game companies: "... I was really surprised that game companies didn't have their content for older

games. They just didn't have it. They didn't have records. They just didn't care about the older games or at least that was the impression that I got from having conversations with them. And that really shocked me... (Smithsonian American Art Museum, 2012). A research paper conducted at the University of Texas at Austin School of Information touched upon the problem of scarcity. The article explores the recent practices of video game archiving and preservation as well as recommend future studies in certain subjects. Authors Brown, Lowrance and Whited explain, "... since videogame archiving does not have a set of standards, the videogame industry does not know what to preserve or how to preserve it" (Brown, Lowrance, and Whited, 2018, p. 2). The lack of emphasis on video game preservation, combined with rapid obsolescence from the video game commercial industry and earlier games having limited quantity releases, make some of the older games much more difficult to find intact.

**Third Party Dependencies:** Due to problems of obsolescence, many video game historians depend upon the use of emulation. The *PVW* uses third party dependencies to mean that LAM rely on the services provided by video game hobbyists and emulator programmers to create these virtual environments, since LAM don't have the resources to make them (McDonough et al., 2010, p.5). When looking through succeeding literature, this is one of the few topics posited by the *PVW* that didn't get further explored by following researchers. This could be due to the fact that cultural organizations aren't worried about the lack of emulators since the "emulation scene" has only grown over the years. Therefore, cultural institutions aren't worried about overcoming this issue, since it is in large a nonissue.

**Complex Proprietary Code:** The source code is the most important component of a video game as it dictates how the game functions (McDonough et al., 2010, p.14). Yet, most source codes are unavailable due to two reasons: (1) video game companies are protective of

them; and, (2) an older practice in the video game industry was disposing of source code after the video game was released. John Andersen, a business consultant for the video game industry, published a three-part article on *Gamasutra* (a video game web journal about the business side of the industry). In the three articles, he reached out to 61 game companies about their preservation procedures and only got responses from 14 of them (Andersen, 2011a, p.1; Andersen, 2011b; Andersen, 2011c). While the bigger developers such as the three console manufacturers (Nintendo, Microsoft, and Sony) all stated they preserved historic materials, some video game companies answers might echo Goodlander's impression. While the remaining 47 companies didn't respond, that could be taken as an answer in itself. Andersen got a surprising admission from one company: "... no video game material such as hardware, software, or source code could be found in its official corporate archive. The company would eventually decline to participate in this article entirely but did promise to further investigate..." (Andersen, 2011a, p.2). One company, Irem Software Engineering, stated they don't have any video games' source code from the 1980s, but preserved the ROMs of the games instead. This is indeed a limitation of video game preservation, since the video game companies themselves aren't preserving their code. It is important to note that the U.S. copyright process at once involved video game companies sending in the first 25 pages and last 25 pages of source code. While that may seem like it would be beneficial, these records are largely incomplete. Dave Gibson, a moving image archivist at the Library of Congress, explained: "... when we get source code, we are only getting a very small excerpt of the source code. So, it really doesn't do us much good ... We aren't really able to use it for preservation purposes" (Smithsonian American Art Museum, 2012). Therefore, source codes from the U.S. Copyright Office aren't good alternatives for the misplaced ones.

A research paper conducted at New York University by Kristen MacDonough explores how the source code is important to video game preservation. In her paper she explains, “In documenting the mechanical aspects of a game, an important step is taking in the source code if it provided ... the source code provides more robust information as to how the file functions” (MacDonough, 2013, p. 45). Therefore, the source code can provide an in-depth look at how and why a game functions the way it does. She adds that the source code also may serve as a communication device between programmers during a project, due to a commenting feature (MacDonough, 2013, p.45). Therefore, preserving the source code is extremely important. This is perhaps one of the biggest limitations of video game preservation, because the ability to have the source code would be beneficial in preventing obsolescence. Yet, the source codes of each game remain a closely kept secret by video game companies and could possibly be destroyed when they are no longer needed.

**Authenticity:** The *PVW* explains that an important problem is ensuring that the digital object is authentic. They explain:

Digital games enjoy many versions between the first prototype, the official release (on multiple platforms), and cracked or otherwise altered unauthorized editions. Especially for older games, the only extant copy may exist in a fan-run web repository, making the authenticity impossible to establish. (McDonough et al., 2010, p.14)

While the *PVW* is worried about authenticity from a digital forensics’ perspective, Melanie Swalwell’s article “Towards the Preservation of Local Computer Game Software” refers to authenticity as being tied to original hardware. Based on research conducted at Victoria University of Wellington in New Zealand, she states that: “Fidelity of the preserved software was important to us, as was conserving the user experience with the software ... The look and feel of the original hardware is the major ‘loss’ in our project” (Swalwell, 2009, p.276). James Newman, author of *Best Before: Videogames, Supersession and Obsolescence* reiterates

Swalwell's definition especially when it comes to questioning how authentic of an experience an emulator can produce (Newman, 2012, p. 7). Regardless of the *PVW*'s perspective of digital forensic "authenticity" or Swalwell's "look and feel" perspective of "authenticity" this is indeed a current challenge when it comes to video game preservation.

**Intellectual Property Rights:** This is a subject that has changed greatly with time. Some preservation actions that were once considered illegal are no longer due to new regulations issued by the Copyright Office in 2015 and 2018. In U.S. law, the Digital Millennium Copyright Act (DMCA) is perhaps the most pertinent law when dealing with video game preservation, since the DMCA is focused on copyright law in reference to digital and technology areas. While U.S. copyright law has found that the use of emulation is legal, it remains a bit of a gray area. The restrictions are that an emulator must be a complete reverse-engineered product and therefore does not contain any software taken from the original system (McDonough et al., 2010, p.55). According to the *PVW*, "...companies that do not wish to see emulators for their products are more frequently turning to patents as a means of restraining the development of competing technology." (McDonough et al, 2010, p. 56). Therefore, emulators have been a constant struggle between the hobby preservationists and the video game industry.

Yet, it is important to understand that these problems usually only apply to the hobbyist side and not the LAM side of preservation. Since the final report of the *PVW* was released in 2010, the subject of LAM video game preservation has changed in the U.S. There have been two major revisions that affect video game preservation. In 2015, the Copyright Office enacted an addendum which dictated that LAM could circumvent digital rights management (DRM) authentication for single-player titles (Birnbaum and Gault, 2018). To clarify, video game companies implement security measures to ensure that the game is a legitimate version.

Therefore, some single-player games still require an online connection so that the server network can authenticate. In 2018, another revision was enacted that allowed for LAM to run their own servers to aid in the preservation of network games (i.e. such as a massively multiplayer online role-playing game or “MMORPG” like World of Warcraft) (Birnbaum and Gault, 2018). It is important to refer to the original texts to understand the current state of video game preservation.

As stated in the 2018 “Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies:”

Video games in the form of computer programs embodied in physical or downloaded formats that have been lawfully acquired as complete games, that do not require access to an external computer server for gameplay, and there are no longer reasonably available in the commercial marketplace, solely for the purpose of preservation of the game in a playable form by an eligible library, archives, or museum, where such activities are carried out without any purpose of direct or indirect commercial advantage and the video game is not distributed or made available outside of the physical premises of the eligible library, archives, or museum. (U.S. Copyright Office, 2018, p. 59)

From this statement, as well as the trends from previous published exemptions, LAM are getting more power to preserve video games. However, it should be noted that there are still some rejected exemptions with the 2018 publishing. The Acting Register found that the server software required for preservation would need to be lawfully acquired (U.S. Copyright Office, 2018, p. 58). This means that a LAM would have to request the server network code from the video game company, which would be similar to asking for source. Therefore, while it is a step in the right direction, it doesn’t necessarily mean that LAM can preserve network games.

Another important point in the 2018 exemption is the request for “affiliate archivists,” (volunteers who wish to have the same exemption status as the LAM, but under the supervision of a LAM and work off-site) (U.S. Copyright Office, 2018, p. 56). The Acting Register did not support the exemption for the “affiliate archivists” (U.S. Copyright Office, 2018. P. 58). This means that hobbyist video game preservationists don’t have the exemption status that is applied

to a LAM. This is an important point considering the importance of the hobbyist role in video game preservation. Therefore, Intellectual Property Rights continues to be a hard limitation for video game preservation. Yet, it is important to note that the laws continue to change and from looking at the trend, beneficial for video game preservation.

**Significant Properties and Context:** While acknowledged as two separate challenges in the *PVW*, they are somewhat related. The *PVW* defines significant properties in the following excerpt:

What are the significant properties of a game that must be maintained with each transformation/preservation action? What makes Mario Mario? How important are font sizes and color palette? What about the speed of text scrolling or sprite movement? What about controllers? What faithful must we stay to the original code? Significant properties are essential to define, as they play a major role in determining authenticity. (McDonough et al., 2010, p.14)

This challenge is strongly connected with the previous topic of authenticity. Using a *PVW* lens, “authenticity” is a more digital forensic view of authenticity (i.e. to ensure that the digital object hasn’t been tampered with prior to ingest). As previously stated Swalwell’s definition of “authenticity” pertaining to the “look and feel” is how the *PVW* defines significant properties. The second topic of context is also related to this. If significant properties is about ensuring that the “look and feel” of a game is authentic to when it was originally released, context is about how to best capture the significance of a video game release amongst its peers (e.g. how to showcase Pong, which may appear rudimentary, next to contemporary game that offer a lot more complexity, yet show both are equally important) (McDonough et al., 2010, p.14). Both significant properties and context are challenges, because LAM professionals might be unaware as to what is deemed significant. While a significant property of a game can be the aesthetic choice, it always isn’t that easy. Some significant properties are not located within the object itself. Take for instance *World of Warcraft*, a game where players connect to a server and play

together with thousands of other players in real-time. Trevor Owens, Head of Digital Content Management at the Library of Congress, wrote, “If you were able to make sense of keeping versions of the software and able to run your own instance of the server when you logged in it would be hard to really call the thing you ended up in the game. You would log into a giant lonely empty world” (Owens, 2017, p.66). What Owens is describing is the fact that while it is important to preserve *World of Warcraft* the object, one can’t as easily preserve the *World of Warcraft* experience since it requires player interaction. Therefore, it is important to consider how to showcase a video game accurately. This requires preserving the essential elements of the game (i.e. “the look and feel”) while conveying the context (i.e. the impact upon release) of its release.

As explored previously, there are a lot of challenges and limitations when it comes to video game preservation. Intellectual property rights, third party dependencies, and the lack of the source code serve as hard limitations for a LAM. Obsolescence is both a challenge and a limitation. There is very little cultural organization can do to save artifacts that have already disappeared. Yet, LAM can act quickly to start (or continue) to save these artifacts before they are lost to time and triage the hardware objects in order to extend their lives to the best of their ability. Other concepts such as authenticity, significant properties, context serve as challenges to how professionals’ approach, analyze, and emphasize video games and their properties. Yet, these are the very reasons to engage in video game preservation. Therefore, it is important to focus on these challenges to better cultural organization’s strategies in collecting and preserving video games. These topics also prove to be difficult in the context of how they are displayed in exhibits. How a museum analyzes the significant properties of the video game often dictates their strategies in displaying it.



## The Second Lens: Video Game Exhibition

The amount of scholarship on video game exhibition is far smaller than that of video game preservation. Based on the literature, the author found that video game exhibition strategies rely on three major approaches. The author of this paper proposes the terms “hands-off,” “hands-on,” and “hybrid” as the terms to delineate between the three strategies. The subject of video game exhibition is much more nuanced than a typical object exhibition. This is since most museum objects are a visual medium and are interacted only by observation (usually through a protective case). It isn’t the authors argument to say video games cannot be appreciated in this way. For example, seeing a physical copy of *Nintendo World Championships 1990*, a game that was made specifically for the Nintendo World Championships competition and only had reportedly 116 copies made, shown off as a physical object would be understandable (“Nintendo World Championships 1990, n.d.). The point of contention is video games are inherently an interactive medium that require engagement to understand what the object has to offer. Yet, simply creating an interactivity exhibit in a public space, like a museum, would put a lot of strain on an object. The questions and strategies of video game displays is addressed in further detail below.

**Hands-off:** In a research paper, published at Abertay University in Scotland, entitled “Exhibition Strategies for Videogames in Art Institutions,” author Emilie Reed showcases both approaches effectively. One of the most famous “hands-off” approaches is the MoMA’s video game exhibition, in which: “... Paola Antonelli, curator of the collection, was clear that they were collecting the games as design objects...” (Reed, 2017, p.4). This means that some games were displayed as traditional art pieces and therefore only observed visually based on aesthetic.

MoMA uses “hands-off” experiences for certain games that are quite complex and hard to showcase through an interactive exhibit, by using a video or screenshot to highlight the important aspects of the game (Hall, 2014). This is further explored in Appendix B, which focuses on how MoMA displayed *Dwarf Fortress*, a complex game that requires tens of hours of gameplay to even understand the game.

**Hands-on:** Reed also showcases a “hands-on” approach with a case study of the Blank Arcade 2016 exhibition in Scotland. This exhibition is used to engage visitors, by allowing them to learn about video games through interaction rather than observation (Reed, 2017, p.5). Cultural organizations, such as the National Videogame Archive, Strong National Museum of Play, and the MoMA (for certain games), follow this philosophy. Some see interaction as a necessary step of the art, such as the University of Arizona’s Learning Game Initiative Research Archive whose principle is “preservation through use” (University of Arizona, n.d.). A counterpoint to interaction is the damage. Tiarna Doherty, chief conservator at the Smithsonian American Art Museum explained, “... as games might break, maybe you’ll have some problem with hardware, you have to learn how to fix it and your remember how to do it... as things break we have to work as a team and sometimes bring in what we call an integrator or an electrical engineer to help us figure out to put the piece back together and often that’s not something you learn out of a book. You have to learn it from experience...” (Smithsonian American Art Museum, 2012). This showcases that fixing and maintaining the equipment isn’t easy. It also can be challenging to find replacement parts depending on the age of the equipment. Another concern is if it is financially sustainable to have a hands-on exhibit, since the constant work and hiring an electric engineer is expensive. A way around this is to have video games playable through emulators as seen at the MoMA exhibit (B. Brown, 2017).

**Hybrid:** In a published paper from the University of Exeter, UK, Sofia Romualdo's article, "Curating the Arcade: Strategies for the Exhibition of Videogames," largely echoes the two approaches of video game exhibition. Romualdo does, however, explain that the two approaches aren't mutually exclusive. She posits that when one person is engaged with the interactive medium that other visitors may also be engaged by watching the video game and therefore become a participant by observation (Romualdo, 2017, p.33). Therefore, it is possible to have both, but this also means that a visitor must engage with the exhibition for others to observe (while a more traditional "hands-off" exhibition does not require that engagement to be effective). This "hybrid" strategy was echoed by Georgina Goodlander of the Smithsonian American Art Museum, whose approach largely encompassed both hands-off displays and hands-on displays. She explained that their strategy was to: "Open up those experiences and allow multiple people to watch, even if one person can only play at a time" (Smithsonian American Art Museum, 2012). Being able to appreciate the game as an interactive medium doesn't require interaction from that individual.

Another research paper from the University of Tampere in Finland, "Constructing Digital Game Exhibitions" by Niklas Nylund delineates the different exhibitions strategies as "object" or "experience" exhibitions (Nylund, 2018, p.3). Nylund explains, "This study understands games in exhibitions as *objects* or *experiences*, that is, as either material artifacts (i.e., physical things) or as interactive software artifacts (i.e., games playable on screens)" (Nylund, 2018, p.3). For Nylund, exhibition strategies are more about how the museum wants to showcase a video game, as an object or an experience. Since video games are both, this causes some conflicts. Yet, he explains that the two are not mutually exclusive. An exhibition that offers both, an object and an experience, as a single display is a "original experience" (Nylund, 2018, p.3). He defines it as:

“...game experiences played on original game hardware and controllers (Nylund, 2018, p.3). One of the important considerations mentioned in Nylund’s paper is the fact that while he believes that the ideal way to exhibit games is as one that showcases the “original experience” along with context (see the context section above for a definition) (Nylund, 2018, p.8). While it is difficult to argue his position, it is also logistically difficult for a museum to do this. He even admits that many factors contribute to a museum’s decision and it might not be possible for a museum to showcase every game in an “original experience” (Nylund, 2018, p.8). Therefore, a blanket strategy is not the best idea and games should be analyzed on a case-by-case basis to determine if they are effective exhibits. This is reminiscent of the MoMA strategy, where they approached each game separately and decided on how best to display it to the public, since they used both the “hands-on” method as well as the “hands-off” method.

As explored, video game exhibitions are quite a dilemma. While there are some interesting solutions, especially the MoMA’s use of emulators rather than the physical hardware (therefore preserving the physical object while allowing interactivity with the digital object) some may see this as an inauthentic experience, such as Nylund’s concept of the “original experience.” Yet, the MoMA follows Nylund’s views on approaching each game on a case-by-case basis. Some games are better “hands-on” experiences, while others are better “hands-off” displays. There is also Romualdo’s “hybrid” strategy, that shows that both methods are not mutually exclusive. Some may see that using “hands-off” experiences as a good solution for showcasing more complex games, while some may argue that interaction with a video game is necessary to fully understand it. Therefore, each video game exhibition strategy has its benefits and shortcomings.

### Methods

The methodologies this research paper employs are a literature review of existing articles and an analysis of the significant properties using a selection of games. Since the goal of this paper is to explore the three important questions (What are the limitations and challenges of video game preservation? What preservation strategies are effective for video games? What are the current strategies for exhibition?), the analysis of current scholarship allows for the readers to understand current trends as well as what the current literature might believe are the answers to the previously mentioned questions. The author uses the *PVW* as the foundation of conveying the information, due to its significance and impact within the literature. Then he uses other research reports to reinforce the *PVW*'s assertions or to offer a counterview. The method of gathering the scholarship was by using search engines such as Google to search for "Video Game Preservation" and "Video Game Exhibits." The author also used the University of Virginia Library and the Johns Hopkins Sheridan Library using the same search parameters. After reading through a source, the author then would look at the references of said article and locate those articles as well. This is used to build a lexicon when conducting the second methodology: a first-hand analysis of significant properties of the games themselves.

The analysis of the significant properties of the video games themselves allows a hands-on approach of the video games to create a model that LAM can follow themselves. The goal is to use the information from the literature review and the game analyses to create a model. This model serves to educate and guide cultural organizations that are not familiar with video games as a medium and help them decipher what elements and what strategies are best implemented. The goal of this method is to ensure a strategy is created by the institute that best serves both the museum and the community.

## Results

### Model for Identifying Significance

A problem with video game preservation is that it is difficult to define what one is attempting to preserve. Like a majority of digital media art, it needs to be approached both with an artistic and technological lens. It is important to come up with a model on what is significant so that LAM professionals know how to approach the preservation of a video game without losing an essential element of it. This approach should also be applied to exhibitions of video games, since they are how a large majority of the community interact with historical objects.

To start, a model should contain reasons for acquisition. The MOMA published an article on their criteria for appraising objects. The six criteria are: Form and Meaning, Function and Meaning, Innovation, Cultural Impact, Process, and Necessity (Antonelli, 2010). She defines them as follows:

*Form and Meaning.* The formal, visual qualities of an object are tied to beauty, an important prerequisite in an art museum, but also an elusive and subjective one. Objects are expected to communicate values that go well beyond their formal and functional presence, starting with the designer's idea and intention. The best design embodies the designer's original concept in the finished object in a transparent and powerful way.

*Function and Meaning.* The appreciation of function has changed dramatically in the last few decades. Some objects are designed to elicit emotions or inspiration, and these intangible purposes are also considered part of their functional makeup.

*Innovation.* Good designers transform the most momentous scientific and technological revolutions into objects that anybody can use. With this in mind, curators often look for objects that target new issues or address old ones in a new way.

*Cultural Impact.* MoMA has always privileged objects that, whether mass-marketed or developed experimentally in a designer's workshop, have the power to influence material culture and touch the greatest number of people. Their impact can either be direct—effective the minute they are purchased and used—or unfold over time through the inspiration they give to other designers.

*Process.* Curators don't stop at the object—they also take into account its entire life cycle as a product. This includes the way it is designed and built and the economy of means in its production, distribution, and use; the way it addresses complexity by celebrating simplicity; its impact on society and the environment; and the way it ages and dies.

*Necessity.* Here is the ultimate litmus test: if this object had never been designed and produced, would the world miss it, even just a bit? As disarming as this question might

seem, it really works. Try it at home. (Antonelli, 2010)

This model is effective as a framework for defining significance of an object before acquisition.

These criteria are an exercise at looking at not only the significance of the object, but the significance outside of an object as well. It is useful to use this model to approach why a LAM is looking at a certain video game and ensuring that the game is significant enough to be worthy of accessioning. *Form and Meaning* derives from the MoMA's desire to convey the visual qualities of an object. In the case of video games, this remains relatively the same except the term aesthetic in this case should refer to audio as well as visual qualities. There are many different aesthetics used in video games to communicate different feelings. The game *Doom* utilizes a controversial aesthetic of ultra-violence (as seen below in Figure 1) to communicate the ruthlessness of the setting. In contrast, the game *Katamari Damacy* uses a variety of colors with its cartoony aesthetic (as seen in Figure 2) to convey an absurd and whimsical feeling. Aesthetics of a game help reinforce the themes and emotions a game is trying to convey. Therefore, aesthetics is an important significant property



Figure 1. *Doom* made by id Software, released 1993 (Sreejithnk2000, 2010). Figure 2. *Katamari Damacy* by Namco, released 2004 (Melesse, 2007).

*Function and Meaning*, similar to *Form and Meaning*, is about an object conveying emotions to the observer, usually based on design and/or narrative. In video games, this would refer to how the game functions, such as the mechanics of gameplay or the story of the game (if present). This can be as simple as the height Mario jumps or as complex as the narrative in *Chrono Trigger*.

Like *Function and Meaning*, this points to the significant properties of the video game.

*Innovating* is the intersect between a video game's significant properties and the context of its release. Therefore, a game that is applauded upon release for its revolutionary game mechanics, aesthetics or narrative will often make a large impact on the industry. An example would be the innovation of *Doom* in the industry. *Doom* became so successful, that other game companies attempted to make their own games similar to *Doom*. This genre in its infancy was referred to as "Doom clones" but would eventually be known as "first-person shooters" (Schneider, 2016). The innovation of *Doom* brought many derivatives works (some of which found their own success) and started an entirely new genre. The concept of *innovation* is important for video game preservation as it shows both significant properties and context. *Cultural Impact* is another important way to look at context, as well as a help when it comes to deciding what games to look at for acquisition. A game that has transcended the gaming subculture is a good indicator of success, for example the recognizability of characters such as Pikachu from *Pokemon* or Mario has far transcended their origins as video game characters. A LAM can use *cultural impact* to help in deciding the historical or cultural significance of a video game. *Process* is the act of analyzing the significance of a game based on its entire life, not just when it was originally released. This is an interesting case, because it is a form of analyzing the context of a video game, but the context of its age rather than focusing on its release. A way to approach this question in video games is looking at how critics' views have changed for a certain game. If the



critics seem to hold more reverence for it after many years in comparison to when it first came out, it is a good indicator of *process*. Another strategy is looking to see if there is a hobbyist scene around it (like the aforementioned *Daggerfall Unity*). One point of contention with the MOMA model is *Necessity*. The concept of pondering whether the world would miss the object is a bit harsh. Yet, it is important to view one's organization as part of a community. Another library, archive, or museum might already be preserving that certain objects and therefore, preserving your object might have a lesser impact. For example, if everyone preserved a copy of *Legend of Zelda* for the Nintendo Entertainment System, due to its significance in the video game industry, each preserved copy would be less beneficial. Also, each *Legend of Zelda* requires valuable resources which could be used on lesser known games that also made an impact into the video game industry. In the cases of adapting this model, "Necessity" should be looked at as: "If my LAM didn't preserve this object, would the world miss it?" The emphasis is, the world wouldn't miss it if another LAM had already had that object in their collection. The MoMA assessment model serves as a good foundation for a Video Game Significant Properties model.

### **What are video games studied for?**

Another important approach, in conjunction with the previous paragraph on significance, is who is the designated community of the LAM and how do they interact with the video game objects. This can vary quite a bit depending on who you ask. For example, from the perspective of the Library of Congress, Dave Gibson explains:

The collection of games that we retrieved from the Main Reading Room can be split into two basic categories: educational games that support the Library's educational initiatives and controversial games that were most likely collected to support legislation related to sex and violence in video games and the effects of these games on the nation's youth.

(Owens, 2012).

While this might not be as true as it was back in 2012 as the Moving Image Collection of video games has greatly expanded, it is important to focus on the fact that the Library of Congress is looking at how their audience is interacting with their collection. Therefore, as LAM professionals, it is important to understand how video games are studied. One way to approach this is by observing how academia studies video games. In a book entitled *Understanding Video Games: The Essential Introduction*, it breaks down the different ways academia is analyzing video games and for what purpose. It concludes that there are five major aspects of analysis: the game, the players, the culture, ontology, and metrics (Egenfeldt-Nielsen, Smith, & Tosca, 2012, p. 10). What is classified as “the game” is considered ludology, or the study of games. This is about analyzing the aspects of the video games that make a game from the aspect of a designer. The aspect of “the players” is focused on how video games affect the players, this is from the perspective of sociology and ethnography. The focus on “the culture” is the study of how video games affect culture and how certain video games create unique subcultures, examples such as online social games. Ontology is the approach of study that looks at video games with a philosophical lens. Finally, the focus on “metrics” is the study of data in association of video games and the culture that surrounds it (Egenfeldt-Nielsen, Smith, & Tosca, 2012, p. 10). A popular example is how *World of Warcraft* (and MMORPGS as a whole) is the subject of many sociological studies. More information can be found in Appendix B under the *World of Warcraft* section. Using the benchmark of how games are looked at is another strategy of what significant properties of video games are important, which is something that LAM should be thinking about before acquiring and ingesting.

### Significant Properties Outside of the Game Object

This paper has showcased the importance and impact of significant properties to both preservation process and exhibition process. Yet, sometimes a significant property can be a difficult thing to articulate or preserve, because the significant element might not be within the object itself. As one can see in reading the entry on *World of Warcraft* in Appendix B, it may be an experience more so than the actual game. An experience is much trickier to preserve than a physical (or digital) object. Sometimes the significance found outside of the object isn't as ephemeral as the *World of Warcraft* example. Some video games' significant elements are found in how a player interacts with the game on a more tangible level. Trevor Owen of the Library of Congress, explains, "When you get serious about preservation intent you will often find what is the most significant about an object in a given context isn't best captured and preserved in the object itself" (Owen, 2017, p.61). When looking at a video game in its entirety it requires: an output, an input, a computer to run the script, and then the game (the script). There are many approaches of finding a physical significant property which lies outside of the game that is necessary for an authentic experience. Previously, the article talked about how CRT televisions can be seen as part of the authentic experience. Yet, the display alone isn't the only thing that may be necessary for an authentic experience. Rachel Donahue, one of the researchers of the *Preserving Virtual Worlds* project explains: "...the difficulty and challenge in a game is moderated by the placement of buttons on the controller and if you take that away and you let somebody map the keys whatever keys they want in a keyboard ... that dramatically changes gameplay" (Smithsonian American Art Museum, 2012). Therefore, it can also be arguable that the gamepad can be part of the authentic experience. What other physical examples, besides display and the gamepad, could be deemed significant properties? Two examples highlighted in

Appendix B are *Star Fox 64*, which uses a gamepad peripheral to enhance the game and the Brown Box, which required an overlay that attaches to the tv. All examples: *World of Warcraft*, *Star Fox 64*, and the Brown Box showcase how significance properties of video games may be external to the digital object of the video game.

### **Using Video Game Criticism to Help Define Context and Significance**

The authors explained in the final *PVW* report that two challenges were understanding video game significance and context. This paper has been attempting to explain the concepts of significance for individuals who might not be familiar with video games. Yet context (i.e. appreciating the game on its merits at the time of its release), also need to be addressed. Seeing an impactful game from the 1980s wouldn't be as impactful to the visitor if they also saw an impactful game from the 2010s. The goal is to observe and appreciate the game on its merits amongst its peers (peers meaning the games that were released around the same time). Video Game journalism websites such as *Polygon*, *Kotaku*, *Game Informer*, *Giantbomb*, *Gamespot*, *PC Gamer* and *IGN* offer a wide variety of criticism and conversations on many games. Some of these websites go further back than others, which may or may not be helpful depending on the age of the game (since the game release might predate these websites). Older (often discontinued) physical magazines offer a wealth of information when it comes to older games. Magazines such as *Computer and Video Games*, *Electronic Gaming Monthly*, *Nintendo Power* (only for Nintendo platforms), *Official U.S. PlayStation Magazine* (only for PlayStation platforms), *Official Xbox Magazine* (only for Xbox platforms), *Sega Visions* (only for Sega platforms) along with many others can provide a lot of contextual information on how these video games were regarded upon release. All the magazines specifically mentioned have been

digitized and made available through the Internet Archive (<http://archive.org>) from video game preservationist hobbyists. There are also certain sites such as *Retronauts*, which focuses on looking back to old video games to analyze them as well as look at their impact in the larger video game subculture with a contemporary lens (this harkens to the MOMA's criteria of *process*). Sources such as these are incredibly effective at understanding if a game is significant, how it is significant, and what contexts LAM should look to when thinking about the digital object. In Appendix B, the author uses *Final Fantasy 4* to showcase why it is important to use these sources to find the significance and context of a video game. Using video game journals and the expertise of video game critics is extremely helpful in the process of discovering the significant properties and context of a video game. Therefore, it is recommended to use these sources when filling out the questionnaire presented in this paper.

### **Creating a Taxonomy to Dictate How Best to Preserve and Exhibit**

One might fall into a trap of using a taxonomy such as genre as a significant property of how a video game should be preserved or exhibited. While this may work in some cases (such as analyzing a game's context through a genre lens because it is how the industry tends to do it), video game genres are often times quite ephemeral and depending on the journalist or retail store, will use vary wildly. An example of this is how the popular game *Minecraft*, developed by Mojang, was described in terms of genre. The following is a list is from the article "Why Video Games Genres Fail: A Classificatory Analysis" which showcases *Minecraft* attributed genre followed in parentheses by the source:

- “● Sandbox, Survival (Wikipedia)
- Simulation (Allgame, GameStop)
- Action (Mobygames)
- Action-Adventure (Giantbomb)

- Adventure (1UP, Common sense media)
- Adventure>First-Person>Fantasy (Gamefaqs)
- First-Person Action (IGN)
- Fantasy (Metacritic)
- City Simulation (Neoseeker)
- Strategy (PSN)
- Action & Adventure, Strategy & Simulation (Xbox Live)
- 3D, Adventure, First-person (Gamespot).” (Clarke, Lee, & Clark, 2015, p. 8)

As one can see, there is a bit of discrepancy of how to describe more genre bending titles that don't fit neatly within a category. While using genre can be a bit problematic, it also can help in moderation. For example, the author would find using arcade or puzzle games as an interactive exhibit far more effective than using other genres. This is due to arcade and puzzle games being more short-duration and repetitive games that focus less on narration and more on game mechanics. Some examples are *Pac-Man*, *Tetris*, *Space Invaders*, and *Lemmings*. Now, it is important to take into consideration of how a game is interacted with rather than the genre, but in some cases, it can be indicative by genre. The author believes that while there can be some merit to using genre, LAM should produce a new taxonomy by which video games are analyzed based on how they are interacted with. This new taxonomy would be helpful in gaging a strategy for preserving and exhibiting. While this is outside the scope of this article, it would be beneficial to help LAM professionals approach video games without the specialized knowledge. An example of a taxonomy based on the research and findings from both literature and first-hand analyses of games are the following (each one followed up with observations):

**Number of Players:**

**Single** (only one person can play at a time) **or;**

**Multiplayer** (multiple people can play, anywhere from a second person on the same screen to thousands in an MMO)

The number of players is an important classification of games. A game with multiple players not only requires a different preservation and exhibition strategy (to ensure that the social aspect it

convey), but also points to an external significant property tied with experience (such as *World of Warcraft*). An important note is that a multiplayer game with up to four players may be a better “hands-on” exhibit, due to the ease of showcasing the social experience aspect in a public space with such a small number in a public space (this is due to a video game trend where the industry’s norm of player per a single console and display was four). If the number of players is more than four, it might be easier to display a video to show how the game functioned socially with so many players.

**Video Game focus:**

**Narrative** (the game is attempting to tell a story, usually with the help of game mechanics) **or;**

**Game Mechanic** (the focus of the game is mechanical)

The focus of a video game is an indicator of video game significance. If a video game is more dependent upon its game mechanics, it means that it might be easier to convey that significance in a museum setting with a “hands-on” exhibit. Meanwhile, a narrative focused game is a more effective “hands-off” game. This is due to a narrative being much more difficult to convey with such a limited time of interactivity and therefore an edited video might be more effective in conveying a plot to a museum visitor.

**Video Game mode:**

**Progressive** (the game is played over many sessions and typically has a definitive end) **or;**

**Static** (this game usually is round-based, and typically one starts a new game upon turning it on rather than continuing where one left off)

Progressive games have save states (i.e. the concept of saving one’s progress in a game.

Therefore, being able to load the progress for the next session) and require multiple sessions to beat. Most modern games are progressive games, since most games are much longer than their predecessors. Progressive games tend to make better “hands-off” exhibits due to the structure often associated with a longer game (they tend to onboard the player over an hour or more,

therefore it is difficult to get a sense of a game within the beginning of a progressive game).

Meanwhile static games tend to not have a save state and typically start over each time they are booted up. Most old arcade games are static. Static games are much more effective “hands-on” exhibits than their counterpart.

**Network:**

**Offline** (this game doesn’t connect to a server) **or;**

**Online** (this game does connect to a server)

As noted, network codes can be difficult to acquire for a LAM. In some case, a game can be single player but still require server access. In most cases, this is for DRM (as stated earlier in the Intellectual Property Rights section). In these circumstances, a LAM can legally bypass the DRM check for preservation purposes. Yet, some outliers exist such as a single player game that uses asynchronous multiplayer mechanics via a network server. An example of this can be found in *Fire Emblem: Three Houses*, in which a player must decide wisely what tasks they wish to conduct with their limited time (they can only choose one task at a time). The network aspect of the game shows the player the percentage breakdown of all other players’ choices, therefore there is a bit of a social/statistic element of the game. In this case, the game is single player but there is some asynchronous network mechanics. Therefore, this is an important classification to gauge for preservation purposes.

**Display:**

**Traditional** (Abstractive, playing from a traditional computer monitor, television screen, or a small portable screen) **or;**

**Immersive** (typically an AR, VR or MR experience, usually have a device attached to one’s head to deprive of certain senses in order to force the user to use the outputs of the screen)

The type of display has an important bearing on preservation strategies of a significant properties. If a game uses an immersive display, this points to a significant property being found outside the digital video game object: the immersive visual display peripheral. The visual display



peripheral is an essential element for conveying the significant properties of an immersive displayed game.

### **Input**

**Traditional** (Using traditional switch mechanisms to manipulate the game, such as buttons from a controller or a keyboard) **or**;

**Motion Control** (Using a sensor to record movement to interact with a game)

Similar to the display output, the type of input is also an important consideration of a significant property. While it can be argued that all types of input are a significant property of a video game (as pointed out above in Rachel Donahue's argument above in the "Significant Properties Outside of the Game Object" section), motion control is an important distinction to consider. With motion controls, one's body and movements become an extension of a gamepad. This gives the game a different context that a traditional input wouldn't be able to convey. When it comes to preservation, it is important to maintain this significant property.

Using this taxonomy, one can see that games with single player, mechanically focused, and static elements are optimal for an exhibition setting. This is because it allows for a short duration session where visitors don't have a lot of onboarding (in this case understanding extremely complex games that require multiple hours to showcases deep game mechanics or acquainting a player to a narrative). This is something that MoMA has struggled with when it comes to one of their more complicated games: *Dwarf Fortress*. The *Dwarf Fortress* entry found in Appendix B goes into more detail in how the MoMA used a "hands-off" display that conveyed significance with a video. These taxonomies will help serve as a guideline for LAM decisions as well as serve as ways to find significant properties and possible exhibition strategies.

### **Other Things to Think About**

There are other things that may affect the significant properties of a video game. It is important to understand why one's LAM seeks to acquire the video game. Is the intention to make a collection that highlights a certain aspect of video games? For example, a museum acquiring video games for an exhibit that focuses on video game art styles. The LAM would thus want to highlight the visual aspects, such as art design. Therefore, they should prioritize the authenticity of the art in the game over all other significant properties. It is possible to display a video showcasing the art on a CRT rather than needing to procure the original hardware. Another example is an exhibit that is showcasing video game music and has a selection of Koji Kondo's and Nobuo Uematsu's music. Music from video games varied a lot due to the hardware found in the system, therefore one would need to ensure the aspects of the music are authentic to how it would have sounded on the original system. This would affect how the objects are preserved and to what degree a LAM should focus on.

A model worth exploring is to think about preservation in terms of percentage. All LAM professionals want to perfectly preserve 100% of an object (this would be the platonic ideal version of an object), but as cultural organizations need to accept that fact that compromises must be made for various reasons (financial, technical, or even logistical). Any percentage of preservation is better than not preserving an object at all. An example would be a video of gameplay might represent 20% of a game if it is the sole artifact that represents that game within the archive. A copy of the game on an emulator might be 70%, because the emulator running the game might be imperfect and the physical gamepads aren't being used. While it may be unsustainable to preserve a video game at 100% with current technological, financial, or logistical limitations, it is important to understand that just because a cultural organization can't

perfectly preserve an object doesn't mean it isn't worth articulating, studying, and attempting. The same can be said about the effectiveness of showcasing a video game as a video (non-interactive) rather than one that can be experienced through interaction. Just because a smaller institution might not have the resources to be able to showcase the video game at 100% or 70%, doesn't mean it shouldn't be attempted. 30% is always better than 0%.

### **Conclusion**

Video games are an important part of culture. Therefore, it is important that video games are preserved alongside the other mediums. Yet, there are a lot of challenges when it comes to both video game preservation and exhibition. This paper has explored both topics and how the various aspects of a game (and the conditions surrounding video game preservation) affect a cultural organization's decision for preservation. While there is little one can do with the current hard limitations (copyright laws, obsolescence, and difficulty of acquiring the source code) it is still important to explore these topics. While this paper cannot solve those problems by exploration, this paper has attempted to highlight some of the soft challenges of video game preservation. This paper found that significant properties, context, and video game exhibition strategies to be challenges that requires an in-depth analysis to help discover trends.

This paper showcases many ways to look at a video game's significant properties in hopes that it can help LAM think about what they desire to get out of preserving the object. There are many different ways to articulate significance elements: visual/audio aspects of the video game, physical properties that make the game authentic, ephemeral aspects of the games such as social, how academics research video games, how video game journalism critiqued the game, and how the video game's context. It is also important to understand a cultural

organization's purpose of acquisition and if it for a specific exhibit. Finally, it is extremely difficult with today's financial, technological and logistical situations to perfectly preserve a 100% of a video game. Therefore, it is important to understand that compromises must be made to ensure at least some of the video game's significant properties are preserved. Video games are hard-to-define objects and therefore is it hard to identify what makes a video game worthy of preservation in libraries, archives, or museums. The author hopes that this paper will help libraries, archives and museums decide whether or not to acquire video games, if they do acquire them, how to determine strategies for preserving and exhibiting them. This paper also hopes to create a dialog to help build upon a model for discovering significant properties and help guide video game preservation strategies and exhibits.

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**Appendix A:**  
**Video Game Significant Properties Questionnaire**

1. **Form and Meaning:** What is the visual aesthetics of the video game? What is the audio aesthetics of the game? Are they unique? Do they reinforce the themes the game is trying to convey? Is it effective?
2. **Function and Meaning:** Are the game mechanics effective in evoking an emotion? Is the narrative effective in evoking an emotion? Do the narrative and game mechanics complement each other? Does it achieve what it sets out to do?
3. **Innovation:** Is this an impressive iteration amongst its peers? Does it do something unique that has never been done? Does it refine something that has been done, but does it extremely effective?
4. **Cultural Impact:** Is this video game significant within the video game industry, video game subculture, or culture in general? Has the game transcended the video game subculture in mainstream culture?
5. **Process:** How has the game aged? Has this game lingered on to be a cult classic? Does it continue to have hobbyists modding the game, prolonging its life? Do video game critics look back at it with more reverence than they did when it was first released?
6. **Necessity:** If this video game wasn't designed, would it have changed the video game industry or subculture? Are you the only LAM that will have this object or is it found at another organization?
7. **Number of Players:**
  1. **Single** (only one person can play at a time) **or**

2. **Multiplayer** (multiple people can play, anywhere from a second person on the same screen to thousands in an MMO)
8. **Video Game focus:**
    1. **Narrative** (the game is attempting to tell a story, usually with the help of game mechanics) **or**
    2. **Game Mechanic** (the focus of the game is mechanical)
9. **Video Game mode:**
    1. **Progressive** (the game is played over many sessions and typically has a definitive end) **or**
    2. **Static** (this game usually is round-based, and typically one starts a new game upon turning it on rather than continuing where one left off)
10. **Network:**
    1. **Offline** (this game doesn't connect to a server) **or**
    2. **Online** (this game does connect to a server)
11. **Display:**
    1. **Traditional** (Abstractive, playing from a traditional computer monitor, television screen, or a small portable screen) **or**,
    2. **AR/VR/MR** (Immersive, usually have a device attach to one's head to deprive of certain senses in order to force the user to use the outputs of the screen)
12. **Input**
    1. **Traditional** (Using traditional switch mechanisms to manipulate the game, such as buttons from a controller or a keyboard) **or**;
    2. **Motion Control** (Using a sensor to record movement to interact with a game)

**13. How will the designated community interact with the object? What kind of research would be derived from this object at my LAM?**

**14. Is this video game for a specific event or type of archive?**

## Appendix B: Video Game Analyses

### Brown Box

The Magnavox Odyssey was invented by Ralph Baer, often called the grandfather of video games. The Magnavox Odyssey was one of the first home consoles to be made commercially available. In the book *A Companion to Digital Art*, Ben Fino-Radin writes about the MoMA's experience in creating a hands-on exhibition for the Magnavox Odyssey. The first major problem in creating the interactive display was the fact that the Magnavox Odyssey is an antique console and the amount of use it would get as a display object in the MoMA would eventually break it (Fino-Radin, 2016, p.532). Replacing parts of an antique console would be considerably difficult. Therefore, they consulted with Ralph Baer to use a contemporary replica of the Brown Box (a prototype of the Magnavox Odyssey) and therefore create the authentic feeling of playing a *Magnavox Odyssey* without putting the original object in jeopardy (Fino-Radin, 2016, p.532). This solved the first problem, but a second problem presented itself. In the book he states:

As a way of circumventing the limitations of this technology, and realizing a richer gaming experience, the Odyssey came with color overlays for each game. These overlays were printed on a type of acetate, and would adhere to the cathode ray tube monitor by way of static electricity. These overlays served to essentially set the scene for the game, for example, tennis. (Fino-Radin, 2016, p.531)

Yet, due to the difficulty of acquiring a CRT television, MoMA decided to use a new LCD screen that would then be embedded into the wall. The reasoning for this is because modern LCD screens come in 16:9 or 16:10 widescreen rather than 4:3 full screen proportions.

Therefore, using this monitor would have black bars on the right and left side of the screen since the Brown Box is only capable of displaying in 4:3 ratio. Embedding the screen in the wall allows them to hide the black bars on the side and therefore give the illusion of the output screen

being 4:3 ratio. Yet, another important aspect is the overlays that came with the Magnavox Odyssey. Fino-Radin explains problems with attempting to use the original overlays with the new LCD screen. He states:

Furthermore, use of the original overlays was not possible, since the brightness of the LCD panels used for the exhibition were significantly less than a CRT would have provided, and would not properly illuminate the overlay. Thus, MoMA created a reproduction of the overlay with a level of translucency appropriate for the brightness of the LCD... (Fino-Radin, 2016, p.531).

MoMA decided to use facsimile objects in order to replicate the authentic experience. While they did have access to the original overlays, to capture the authenticity with using a new display they needed to react to the situation to maintain that significant property of the video game. The Brown Box example showcases how it is possible to work around physical significant elements, by creating a replica. This simulates the authentic experience at the cost of the authentic objects.

**Dwarf Fortress:** *Dwarf Fortress* (according to the created taxonomy in this paper: is a single player, game mechanic centered, progressive, offline game) is an ambitious game being consistently worked on and updated by two brothers Tarn and Zach Adams. The game is focused on simulating a fantasy setting that procedurally generates a logical world with a history that simulates civilizations rising and falling, legendary beasts running amok and being hunted, and heroes doing heroic deeds. The amount of complexity means that while it offers lot of content for players to explore, it is hard to showcase that in an exhibit setting. *Polygon*, a video game journal, interviewed Paul Galloway, study center supervisor at MoMA, about this issue. In the article it states:

'It's not feasible right now to let somebody live in our museum for four months and play Dwarf Fortress non-stop' ... The average amount of time a visitor to the MOMA will spend with any given item on display is 4 seconds, [complex games such as *Dwarf Fortress* are] interpreted through cinematic trailers meant to convey to the public the

important parts of their core experience” (Hall, 2014).

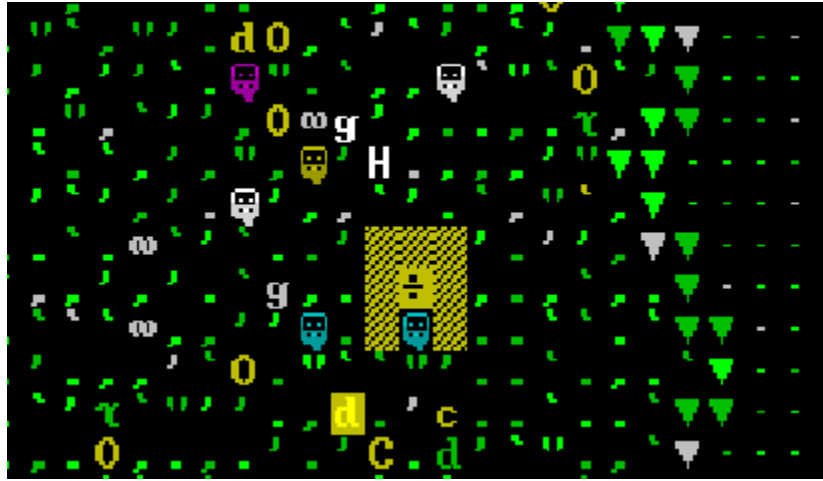


Figure 3. *Dwarf Fortress* made by Bay 12 Games, released 2006 (Ugog Nizdast, 2014).

As Galloway explains, *Dwarf Fortress* is an incredibly complex game. Even just glancing at the graphics (which is based on ASCII characters to invoke an old style of video game graphics) is nonsensical since a lot of the graphics is abstracting information (as seen above in Figure 3). In the game, a letter along with a color represent a certain monster. For example, a gray capital “B” represents a black bear, while a gray lowercase “b” represents a badger. These are just two examples of an entire screen of different tiles and symbols to represent an entire world, which explain why it is difficult to exhibit this game. Meanwhile, due to the complexity of the game mechanics working with each other to attempt to simulate multiple aspects of the game, this creates interesting and unforeseen consequences for in the game. Yet, these can only be appreciated after many hours of learning the game and then playing the game. Therefore, Galloway joked about the difficulty of visitors living in a museum for four months, because it would take an unrealistic amount of time to understand why it belongs in the MoMA among other famous pieces of art. At the end of the interview Galloway states, “We’re going to try again, we’re going to keep going. These things are here forever” (Galloway as cited by Hall, 2014). This is an important thing to understand about LAM work, the way in which we preserve



and display will continue to evolve. According to the interview with Galloway, the way in which individuals interact with a complex game like *Dwarf Fortress* is by watching a video of gameplay that helps them understand the complexity in a short amount of time. Meanwhile, MoMA also has Tetris which is playable (Hall, 2014). This is because it is the ideal taxonomy for exhibition: single player, game mechanics focused, static, and offline. Therefore, one can easily learn the rules and play the game within a couple minutes and understand the depth and impact the game has to offer.

**Final Fantasy 4:** *Final Fantasy IV* is an interesting case of how one goes about describing significant properties to a single game that has had many iterations. As an outsider of video game culture, it can be easy to assume that games with the same title are identical. The concept of a “port” in the video game industry is when a game is re-released onto a different platform (or video game console). A port doesn’t have to be updated or remastered, it can be just the same exact release. This can create confusion of whether a game is just a port or an updated product with the same title. The author has chosen this specific example to highlight how extensive a single game can continuously be iterated on for years. *Final Fantasy IV* was initially released on July 19, 1991 in Japan by the Japanese video game company Square Co. for the Super Nintendo Entertainment System (SNES) (“Final Fantasy IV,” n.d.-b). This was the first *Final Fantasy* game released on the SNES as the previous three games in the franchise has been released on the predecessor system: the Nintendo Entertainment System. Video Game journalist and historian Jeremy Parish of *Retronauts* comments on the game’s narrative, use of music, and evolutionary game mechanics (when compared to both previous *Final Fantasy* installments as well as SNES games being released in 1991) (Parish, 2018). “The Final Fantasy” website echoes Parish’s

comments by stating: “Final Fantasy IV raised the bar for RPG standards and continues to stand as one of the best RPGS of all time ... The title introduced many new elements to the series ...

The game was the first to have an in-depth story that really built on each of the many characters” (“Final Fantasy IV,” n.d.-b). From these two statements, it can be said that Final Fantasy IV is preservation worthy due to its evolutionary design and impact on the genre.

Preservation for this game might not be so straightforward as other games. When it was released four months later in the U.S., it would be titled *Final Fantasy II*. This is due to the fact that *Final Fantasy II* proper<sup>1</sup> and *Final Fantasy III* proper weren’t released in the U.S. for many years. Therefore, *Final Fantasy IV* and *Final Fantasy VI* were localized as *Final Fantasy II* (U.S.) and *Final Fantasy III* (U.S.) to prevent confusion at release (Final Fantasy V was also not localized at release and would take many years before being released). The entirety of *Final Fantasy IV* re-release chronology is as follows:

<b>Title</b>	<b>Platform</b>	<b>Japan Release Date</b>	<b>U.S. Release Date</b>
Final Fantasy IV Easy type	SNES	October 29, 1991	-
Final Fantasy IV	PlayStation	March 21, 1997	-
Final Fantasy Collection	PlayStation	March 11, 1999	-
Final Fantasy Chronicles	PlayStation	-	June 29, 2001
Final Fantasy IV	WonderSwan Color	March 29, 2002	-
Final Fantasy IV Advance	Game Boy Advance	December 15, 2005	December 12, 2005
<b>Final Fantasy IV</b>	<b>Nintendo DS</b>	<b>December 20, 2007</b>	<b>July 22, 2008</b>
Final Fantasy IV (II U.S.)	Wii Virtual Console	August 4, 2009	March 9, 2010
Final Fantasy IV	Mobile Phone (FOMA)	October 5, 2009	-
Final Fantasy IV: The Complete Collection	Sony PSP	March 24, 2011	April 29, 2011
Final Fantasy IV: The Complete Collection	PlayStation Network	March 24, 2011	April 29, 2011
Final Fantasy (PS1)	PlayStation Network	June 27, 2012	-
<b>Final Fantasy IV</b>	<b>Apple iOS</b>	<b>December 20, 2012</b>	<b>December 20, 2012</b>
<b>Final Fantasy IV</b>	<b>Android</b>	<b>June 4, 2013</b>	<b>June 4, 2013</b>
Final Fantasy IV	Wii U Virtual Console	February 19, 2014	-
<b>Final Fantasy IV</b>	<b>PC</b>	<b>September 17, 2014</b>	<b>September 17, 2014</b>
Final Fantasy IV Advance	Wii U Virtual Console	April 13, 2016	-
Final Fantasy IV	Nintendo 3DS Virtual Console	August 23, 2017	-

(T. Brown, 2017; “Final Fantasy IV,” n.d.-a; “Final Fantasy IV,” n.d.-b; Nintendo, n.d.; Square Enix CO, n.d.)

<sup>1</sup> To minimize confusion, the author uses Final Fantasy II proper to denote the second game in the franchise, while Final Fantasy II U.S. is used to denote Final Fantasy IV proper title.

As one can see, it is quite convoluted to look at the many iterations that are available. Some of these are identical re-releases being run on an emulator on a platform such as the Wii/ Wii U/ 3DS Virtual Console. The bold text represents a remake, which is an entirely different game and engine remastered from scratch. Therefore, this game is made from a different team with 3D graphics (rather than the original game's 2D). Yet, as the video game industry ages, ports, remasters, and remakes are going to continue to be released. An article entitled "Combating the March of Time with Remakes and Remasters," explains,

No work of art is immortal, but it certainly seems like video games age like few other forms of art, so quickly that it has become common practice to remaster, or even completely remake games that were new only a few years ago. The reasons for these recreations vary on a case by case basis, but chief among them should be making the original experience accessible to new players. (Branyiczky, 2016).

As game technology advances and video game consoles become outdated, game companies port older games in order to make it available to a newer audience (or the same audience who wishes to own it on a new platform). Therefore, there are going to be situations such as *Final Fantasy IV*, in which there are many different iterations.



Figure 4. Beginning top left and going clockwise: *Final Fantasy II* (1991) for SNES; *Final Fantasy IV Advanced* (2005) for Game Boy Advance; *Final Fantasy IV: The Complete Collection* (2011) for PSP all made by Square Enix (LordRaptor, 2016).

Figure 5. *Final Fantasy IV* (2008) for DS made by Square Enix (Golden, 2018).



From the example of *Final Fantasy IV*, one can see that there can be many different iterations of game (or a game with the exact same title and story but completely rebuilt such as *Final Fantasy IV* on DS). Using video game journalism helped in finding out what made *Final Fantasy IV* significant while also deciphering how many different iterations there are and how each iteration is different. Yet, there are many different contextual situations one can approach in analyzing a game. *Final Fantasy IV* can be compared to other games coming out in 1991 for the SNES (games of similar release windows). It can also be analyzed by comparing it to other role-playing games (games of the same genre). Finally, it can also be analyzed by comparing it to other *Final Fantasy* games or Square games (games of the same franchise or created by the same company). There are many ways to approach analyzing games within context and how to find that information.

**Star Fox 64:** On July 1, 1997, *Star Fox 64* was released in the United States for the Nintendo 64 (Perry, 1997). While this was the second game in its franchise, what made this game a unique experience was the fact that it was bundled with a hardware peripheral called the “Rumble Pak.” The premise of the “Rumble Pak” was that you connected it to the controller and the game would communicate to the player through haptic feedback (e.g. physical sensation of touch), by vibrating the “Rumble Pak.” When an event occurred in the game that caused your ship to shake, such as taking damage, the “Rumble Pak’s” vibration would coincide. According to a review of *Star Fox 64* in the game journal *IGN*, the author wrote: “And let’s not forget that the Rumble Pak, bundled with the game, adds an unusual burst of arcade ecstasy to the game” (Perry, 1997). Now, the question becomes is the preservation of the “Rumble Pak” essential to the significance to *Star Fox 64*? While one could play the game without it and still enjoy it, it is necessary to weight the importance of the creator's intent. This was the first game to use the “Rumble Pak,” so it is clear to see that the game designers felt it enhanced the game. Is it viable or sustainable from the perspective of a LAM to preserve a piece of hardware that isn’t essential, but was rather entirely optional? What about for the sake of preserving just one of the possible experiences that would have been had by this game? These are difficult questions to answer. One must weigh the worth vs. the sustainability. With *Star Fox 64*, the game was released with the “Rumble Pak,” which served as an interesting way to bridge the gap between what the player was experiencing in the game to what the player was experience in reality.

**World of Warcraft:** *World of Warcraft* became a worldwide phenomenon after its release in 2004 by the company Blizzard Entertainment (“World of Warcraft,” n.d.). The game would

become the highest selling massive multiplayer online role-playing game (MMORPG), with having over 11 million subscribers worldwide (“World of Warcraft,” n.d.). To expound, subscribers are individual who pay a monthly fee in order to play the game online with other people. Therefore, there were over 11 million players playing the game concurrently. *World of Warcraft*’s success made it become a recognizable name even for those who don’t play video games. Another aspect of this success made it the target for many academic studies in a variety of departments. Trever Owens highlighted the various ways in which an MMORPG might be preserved. He stated, “The game’s in-game chat system has transmitted a billion of informal communications between players which could be of interest to linguists, sociologists and folklorists interested in studying language habits of its’ global population of players” (Owens, 2017, p.66). Owens is alluding to a MMORPGs, and more specifically *World of Warcraft*, being the target for many different types of academic research. Books and articles such as *The Warcraft Civilization: Social Science in a Virtual World* by William Bainbridge analyze the game through a sociological or psychological lens. In Bainbridge’s book, he states, “Virtual worlds are good environments in which to explore wider issues related to emerging technologies, such as intellectual property rights and sociotechnical implications of online misbehavior” (Bainbridge, 2010, p.12). So, using video games offer an interesting way to analyze how the individual and society change due to technology. In this example, it the actual preservation of *World of Warcraft* for academic research that is problematic, because a lot of what makes it significant is the social impact which isn’t preserved when one archives the digital game. Another difficulty is that the game needs a server to run, which according to DMCA laws is only possible if Blizzard Entertainment willingly donates the source code to a museum. Yet, as Owens points out:

... [T]his sort of digital object is more like the stage on which a play is performed than a painting that hangs on the wall. As such, it makes sense that approaches to documenting a live performance work better ... Stanford University's special collections department has created collections of user-generated videos shared on YouTube as a way to capture both aspects of the game world and also part of the cultural exchange and discourse... (Owens, 2017, p.66)

Therefore, for games like *World of Warcraft*, preserving gameplay through video games while it is active may be the only way to preserve the significant aspects of the game. As noted above the social aspect plays a large part in how video games can be research. Therefore, depending on the game, it is important to consider how future researchers would approach studying this video game.